Charles Pinckney National Historic Site
Tree Inventory & Management Plan | 2012

Submitted by

The Bartlett Inventory Solutions Team

Brandon Hogan, Inventory Arborist and Report Author
ISA Certified Arborist # SO-6465A and Certified Tree Risk Assesor

Michael Murphy, Charles Pinckney National Historic Site Inventory Project Leader
ISA Board Certified Master Arborist #NJ-0146B and Certified Tree Care Safety Professional #780

Michael Sherwood, BIS Manager
ISA Board Certified Master Arborist & Municipal Specialist #SO-1845BM

BARTLETT TREE EXPERTS

Bartlett Tree Experts
The R.A. Bartlett Tree Research Laboratories
13768 Hamilton Road
Charlotte NC 28278-8213
704-588-1503
www.bartlett.com

704-588-1150

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MAKING THE MOST OF YOUR INVENTORY MANAGEMENT PLAN

Those who operate a large business or institution understand how inventory impacts operations and budgeting. One must know what's there, how much or how many, and where it all is. But the task doesn't end there. To obtain the greatest benefit from inventory, owners or their designees must *manage* it. Are a company's tools, for example, old and defective, in need of repair, in short supply, or useless and taking up space that could be better occupied?

A good management plan will address these issues and keep the inventory current, in good condition, and functioning for the benefit and safety of those involved.

Managing trees on a large property can seem like an overwhelming task, but the same principles of inventory management apply. This inventory and management plan should provide managers the data they need to develop realistic budgets for their tree maintenance needs, and it will help make the Charles Pinckney National Historic Site landscape a safer and more beautiful environment.

The following tips will assist you in making the most of this document:

Who's Who

Those who conducted the inventory and prepared this document are members of the Bartlett Inventory Solutions (BIS) team. They are also employees of Bartlett Tree Experts and operate from the Bartlett Tree Research Laboratories in Charlotte, North Carolina. Readers may interpret the terms "Bartlett Tree Experts," "Bartlett," "the BIS team," "the team," "we," and "our" as the Bartlett company and those who conducted the inventory and prepared this management plan.

Subject Trees

In this document, the term "subject trees" refers (depending on context) to some or all of the 133 trees (some of them groupings of trees) included in the inventory.

Definitions & Bolded Terms

Some definitions or specifications are detailed within a given section to explain how readers should interpret certain terms or classifications. We have also appended a Glossary for other terms that appear throughout the document. The first reference to each of these terms appears in bold for the reader's convenience.

How This Document is Organized

As usual, the Table of Contents provides an effective road map to document contents, but following it are a List of Tables and List of Maps that users will find helpful in locating specific findings, recommendations, or tree locations. Also, a handy outline appears on page 6 that introduces the order in which results, recommendations, and the Entire Inventory will appear. All tables, photos, maps, and diagrams have numbered captions for quick reference. Starting with the Introduction, pages are numbered consecutively up to the "Entire Inventory" at the back. So that it can stand alone as a main inventory document, the Entire Inventory starts over with page -1-.

EXECUTIVE SUMMARY

In January, 2012, the Bartlett Inventory Solutions (BIS) Team from Bartlett Tree Experts conducted an inventory of trees in the Charles Pinckney National Historic Site landscape. We identified 133 trees or groupings of trees that included 14 different species. The attributes that we collected include tree latitude and longitude, size, age and condition class, and a visual assessment of tree structure, health, and **vigor**.

We conducted the attribute collection using a sub-meter accuracy Global Positioning Satellite Receiver (GPSr) device with an error-in-location potential of not greater than three meters.

Our recommendations for the subject trees over the next three-year period include:

Pruning
Prune 17 trees (13%) for safety, health, structure, and appearance. Pruning will comply with American National Standards Institute (ANSI) A300 for pruning and ANSI Z133.1 for safety.

Removals
Remove 1 tree (<1%) due to poor tree structure or health.

Tree Risk Assessments
Provide tree risk assessments for 2 trees (1%) to evaluate the impact of wood decay in **stems** and **buttress roots** that show potential for failure.

Cabling & Bracing
Inspect structural support systems in 1 tree (<1%) to reduce risk of branch failure.

Root Collar Excavations
Perform **root collar** excavations to 10 trees (8%) to lower risk of damaging conditions such as **girdling roots**, basal cankers, masking of root decay and lower-stem decay, and predisposing trees to various insect and disease pests.

Integrated Pest Management (IPM)
Implement Bartlett's IPM program to monitor pests and diseases on the subject trees. Treatments are therapeutic and preventive, and treatment timing is based on pest life cycle.

Soil Samples
Collect soil samples throughout the landscape and submit them for analysis that includes presence of soil nutrients, pH, organic matter, and **cation exchange capacity**.

Bulk Density Samples
Collect bulk density samples throughout the landscape to determine the extent of **soil compaction**.

Root Invigoration
Perform Bartlett's patented Root Invigoration program on trees deemed as significant to the landscape to improve aeration and promote more efficient root growth, especially for high-value trees in disturbed areas.

INTRODUCTION

In early winter of 2012, Bartlett Tree Experts preformed an inventory at the Charles Pinckney National Historic Site in Mount Pleasant, SC, of trees in the landscape. Team member Brandon Hogan visited the site on January 24 to conduct the inventory.

The inventory included

- identifying trees within the formal landscape and attaching to each tree a tag with assigned tag number. (Tags 1-133);
- Trees located within the formal landscape were selected for this inventory. Not all trees on the property were included in this inventory;
- identifying the trees' condition, health, and vigor;
- recommending risk evaluations and removals of appropriate trees;
- recommending pruning, soil management, and pest management treatments to promote tree safety, health, appearance, and longevity; and
- mapping the trees using GPSr hardware and Geographic Information System (GIS) software.

The methods and procedures we used to make the above determinations and recommendations are detailed in the following sections.

GOALS & OBJECTIVES

An effective management plan communicates clear goals and the specific objectives designed to carry out those goals. We intend "goal" to mean the overall aim or result we expect to achieve for the client in producing the inventory and management plan. The objectives are the specific actions taken or recommended to support goal completion. Table 1 below describes each goal and its corresponding objective(s).

Table 1: GOALS & OBJECTIVES

GOAL	OBJECTIVES TO ACCOMPLISH GOAL
Establish the tree inventory (per numbers agreed) on the Charles Pinckney National Historic Site.	Using Trimble GeoXT GPSr hardware and ArgGIS 9.3 software, collect data such as tree name, location, size, age class, and condition class.
	Place tag on each tree inventoried.
Provide mechanism for managing inventory, recommendations, and related budget planning.	Provide map or maps of the inventoried trees to assist the client in managing property areas.
	Submit a comprehensive management plan that documents and organizes findings and provides other resources to assist the client in efficient use of the information.
Maximize client understanding and implementation of management plan.	Include in management plan specific explanations and visuals related to plan recommendations.
	Provide appended resources that address health, procedures, and standards related to tree care.
	Make periodic contact with client to follow up and answer any questions about the management plan's contents.
Maximize immediate and long-term tree health and aesthetics.	Implement recommended plant-health-care program that uses • integrated pest management • soil management • maintenance pruning
Manage immediate and long-term risk associated with trees in high-use areas.	Implement recommended risk-management measures that include • risk-reduction pruning • required removals • tree structure evaluations

DATA COLLECTION & TREE INSPECTION METHODOLOGY

In conducting the inventory, we used specialized equipment and software and followed specific procedures to determine tree characteristics, risk evaluations, and recommendations. The following explanation will assist the reader in interpreting the findings of this management plan.

Data Collection Equipment & Attribute Data

The BIS team used the Trimble GeoXT global positioning system receiver (GPSr) hardware unit and accompanying ArgGIS 9.3 software. The attribute data we collected on site are listed below.

- botanical name and regional common name according to local ISA Chapter Tree Species List
- tree location based on GPS coordinate system
- tag number
- diameter at breast height (**DBH**)
- canopy radius
- age class
- height class

- condition class
- root zone infringement, based on **dripline** and estimated **grayscape** (e.g., sidewalks) impact on root zone
- infrastructure interaction (between trees and grayscape that may cause an undesirable condition)
- priority of general tree work (based on 3-year management plan)
- pruning
- need for and inspection of existing cables and braces
- need for and inspection of existing lightning protection
- need for tree hazard evaluations
- tree removals
- soil management recommendations
- pest management recommendations

Specifications/Definitions

Age Class

New Planting	Tree not yet established
Young	Established tree but not in the landscape for many years
Semi-mature	Established tree but has not yet reached full growth potential
Mature	Tree within its full growth potential
Over-mature	Tree that is declining or beginning to decline due to its age

Height Class

Small	Less than 15 feet
Medium	15 to 35 feet
Large	Greater than 35 feet

Condition Class

Dead	
Poor	Most of the canopy displays dieback and undesirable leaf color, inappropriate leaf size or inadequate new growth. Tree or parts of tree are in the process of failure.
Fair	Parts of canopy display undesirable leaf color, inappropriate leaf size, and inadequate new growth. Parts of the tree are likely to fail.
Good	Tree health and condition are acceptable.

Priority of General Tree Work

Priority class recommendations are based on a three-year management plan that takes into consideration tree species, condition, location, age, and proximity to infrastructure. We intend that this rating system assist decision makers in prioritizing tree pruning, cabling and bracing, and tree lightning protection recommendations. *Trees with a priority of 1 and a total Visual Tree Structure Analysis (VTSA) rating of 10 or higher are considered a critical risk (13-15) or high risk (10-12) and*

should be addressed immediately. Prioritization does not take into account any budgetary or financial considerations.

Recommendations for Priorities 1, 2, and 3 are all based on observations by the inventory arborist. The following additional information clarifies each priority class:

Priority 1	To be addressed in years 1 or 2 of the management cycle. Priority 1 may include trees with large dead wood, structural defects, located in exposed sites, high aesthetic value, and/or parts that are currently negatively interacting with infrastructure, such as branches that touch buildings, interfere with signage or lighting, or obstruct pathways.
Priority 2	To be addressed in years 2 or 3 of the management cycle. Priority 2 may include trees with small dead wood, developing structural defects, located in semi-exposed sites, moderate esthetic value, and/or parts that are anticipated to negatively interact with infrastructure, such as branches that touch buildings, interfere with signage or lighting, or obstruct pathways.
Priority 3	To be addressed in year 3 of the management cycle. Priority 3 may include trees with small dead wood, developing structural defects, located in lesser used sites, and/or parts that are anticipated to negatively interact with infrastructure, such as branches that rub on buildings, interfere with signage or lighting, or obstruct pathways.

Pruning

Each of the following is a selective pruning technique to achieve the pruning goal described:

Clean	Remove one or more of dead, diseased, and/or broken branches
Raise	Provide vertical clearance
Thin	Reduce density of live branches
Reduce	Reduce height or spread
Structure	Select live branches and stems to influence orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems

VTSA Inspection Methodology & Risk Rating System

Bartlett's Visual Tree Structure Analysis system (VTSA) ranks the relative degree of risk for prioritizing remedial treatments when managing large tree populations. Bartlett's system uses two criteria: Failure Potential (FP) and Consequence of Failure (CoF). Failure potential considers the severity of defect, architecture, site exposure, and other biological, structural, and site factors that contribute to failure as observed from the ground. Consequence of failure factors in size of the defective plant part, **target** value, and frequency of use and potential for injury/loss should a failure occur as observed from the ground. The following tables describe the rating system in more detail:

Table 2: VTSA RATING SYSTEM - FAILURE POTENTIAL

FAILURE POTENTIAL (FP)		
RISK CATEGORY	**DESCRIPTION**	**POINTS**
Critical Risk	Failure imminent	10
High Risk	Failure likely, especially in storms	7-9
Moderate Risk	Failure possible, especially in severe storms	4-6
Low Risk	Failure unlikely	1-3

Table 3: VTSA RATING SYSTEM - CONSEQUENCE OF FAILURE

CONSEQUENCE OF FAILURE (CoF) These criteria consider potential for injury/loss should a failure occur based on such factors as size of defective plant part, target value, and frequency of use.		
RISK CATEGORY	**DESCRIPTION**	**POINTS**
Severe Consequence	High potential for injury/property loss	5
Moderate Consequence	Moderate potential for property loss and low potential for injury	3-4
Low Consequence	Low potential for any loss	1-2

The Total VTSA = Failure Potential + Consequence of Failure

Table 4: TOTAL VTSA

TOTAL VISUAL TREE STRUCTURE ANALYSIS (VTSA)		
RATING	**RISK CATEGORY**	**DESCRIPTION**
13-15	Critical Risk	Failure imminent. Personal injury and/or property damage inevitable.
10-12	High risk	Failure likely, especially during storms. Personal injury and/or property damage likely.
7-9	Moderate Risk	Failure unlikely, and/or high risk of failure and low risk of property damage/personal injury.
<7	Low Risk	Failure unlikely and low risk of property damage.

Pruning and structural support system procedures will reduce the risk of branch and leader failure to an acceptable level. We emphasize, however, that *all large trees pose a certain degree of inherent risk and this evaluation does not preclude all possibility of failure especially during severe storms.*

For those trees that the client considers hazardous and representing an immediate safety concern, we recommend placing a sign, tape, or other warning indicator near those trees until such time as the hazard can be remedied.

RESULTS & RECOMMENDATIONS

In reviewing the results and recommendations, the reader will find useful the specifications and definitions detailed on page 3 above. We used the following categories to organize the results and recommendations, which are displayed in tables:

- **Results**
  - Stand Dynamics – This characterizes the subject trees according to
    - Condition Class
    - Age Class
    - Tree Groupings
    - Tree Species Identified
    - Tree Size per DBH
    - Estimated Value
  - Conditions or Defects Observed
- **Recommendations**
  - Further Evaluation and Removal
  - Pruning and Structural Support Systems by VTSA Rating and Priority
  - Lightning Protection Systems
  - Soil Management
  - Pest Management
- **Entire Inventory**
  Due to the length and detail of this table, we placed it last, under a major heading, for handy reference.

Where appropriate, we have included explanations, photos, drawings, or other information to illuminate the table contents.

Stand Dynamics

Condition Class

The breakdown of tree condition follows. We have color coded each class to correspond with condition-class colors represented in the maps.

Table 5: CONDITION CLASS BREAKDOWN

Condition Class	Quantity	% of Total
Good	89	67%
Fair	37	28%
Poor	3	2%
Dead	4	3%

Age Class

The breakdown of tree age class follows:

Table 6: AGE CLASS BREAKDOWN

Age Class	Quantity	% of Total
Over-Mature	4	3%
Mature	84	63%
Semi-Mature	44	33%
Young	1	1%

Tree Groupings

The following table displays the tree that we recorded as a grouping:

Table 7: TREES RECORDED AS GROUPINGS

Tag #	Common	Type of Planting
125	live oak	Multiple 2

Tree Species Identified

Our inventory revealed 14 different species of trees, as detailed in the following table:

Table 8: TREE SPECIES IDENTIFIED

Genus	Species	Common	Count	Percentage Distribution Total
Betula	nigra	river birch	1	0.75
Carya	cordiformis	bitternut hickory	3	2.26
	illinonensis	pecan	14	10.53
Carya Total			**17**	**12.78**
Castanea	mollissima	Chinese chestnut	1	0.75
Diospyros	virginiana	persimmon	1	0.75
Ilex	opaca	American holly	1	0.75
Juniperus	virginiana	eastern redcedar	12	9.02
Magnolia	grandiflora	Southern magnolia	16	12.03
Pinus	taeda	loblolly pine	4	3.01
Platanus	occidentalis	American sycamore	1	0.75
Prunus	communis	common pear	3	2.26
Quercus	nigra	water oak	3	2.26
	pagoda	cherrybark oak	1	0.75
	virginiana	live oak	72	54.14
Quercus Total			**76**	**57.14**
Grand Total				100.00

Map 1: 2011 TREE INVENTORY

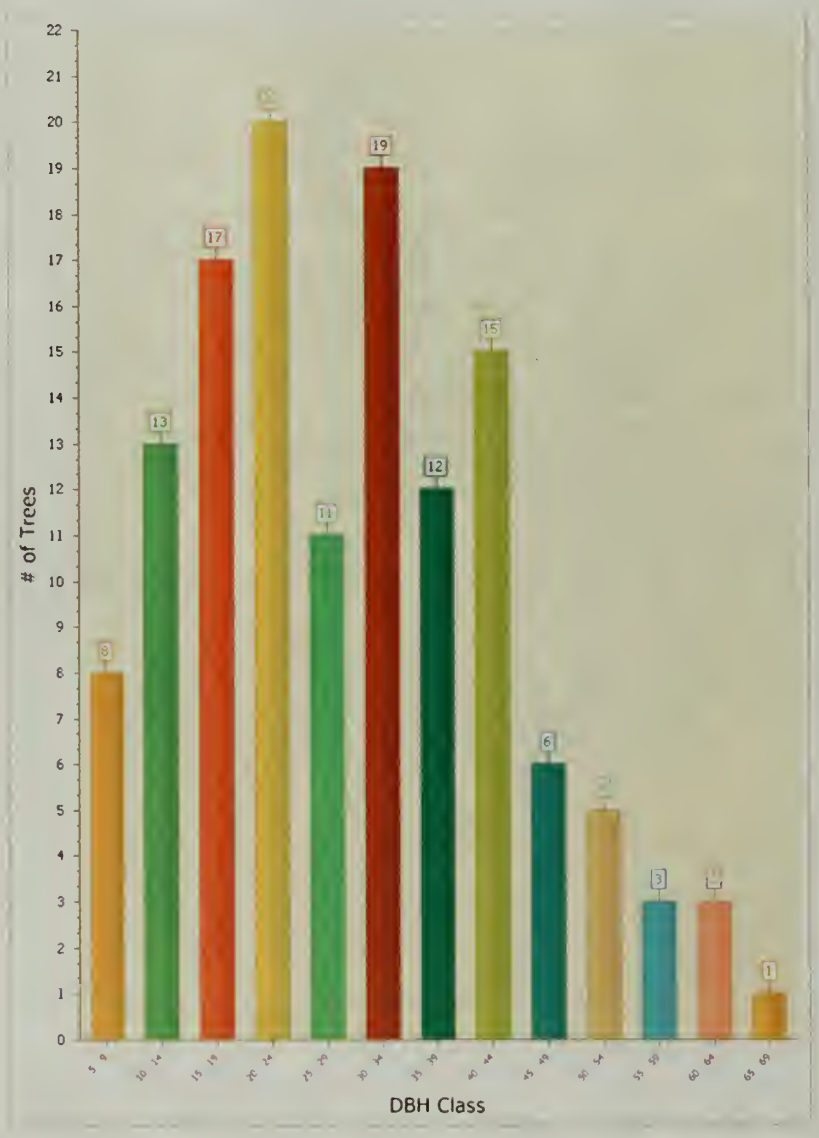
Map 2: TREES BY AGE CLASS

Map 3: TREES BY CONDITION CLASS

Tree Size (DBH)

The following chart illustrates numbers of trees according to size per DBH:

Table 9: TREE SIZE ACCORDING TO DBH



Estimated Value

As part of the Bartlett inventory process, we have included an estimated value for each tree and a cumulative total for each individual tree inventoried. To calculate the estimated value, we use a

modified version[1] of the Trunk Formula Method published by the Council of Tree and Landscape Appraisers in *The Guide for Plant Appraisal,* 9th Edition.

Our estimated value calcuation uses the following data fields in this formula:

Table 10: DATA FIELDS FOR DETERMINING ESTIMATED TREE VALUE

Estimated Value	Size, species factor, condition factor, and location value
Size	Based on tree DBH (4.5 feet above grade)
Species Factor	Relative species desirability based on 100% for the tree in that geographical location. In most cases, species desirability ratings, published by the International Society of Arboriculture, are used for adjustment.
Condition Factor	Rating of the tree's structure and health based on 100%
Location Factor	Average rating for the site and the tree's contribution and placement, based on 100%

The cumulative total value[2] for all trees inventoried is **$2,721,252.** The following table lists the ten trees with the highest estimated values:

Table 11: TOP TEN TREES - HIGHEST ESTIMATED VALUE

Tag #	Common	Diameter	Estimated Value
35	live oak	64	$68,988
44	live oak	60	$65,112
6	live oak	57	$61,959
19	live oak	56	$60,861
117	live oak	50	$53,783
30	live oak	50	$53,783
33	live oak	50	$53,783
24	live oak	68	$51,779
12	live oak	48	$51,236
49	live oak	46	$48,596

[1] This version does not consider cost of purchase and installation of the largest available "like tree."

[2] Estimated cumulative total value is actually greater due to our methodology not taking into account individual trees within tree groupings.

Map 4: TOP 10 TREES - HIGHEST ESTIMATED VALUE

Conditions or Defects Observed

In this (results) section, we list in Table 12 trees on which we observed conditions, defects, or other structural issues. Figure 1 provides an example of a tree with a defect on the stem. We list in Table 13 trees on which we observed girdling roots (or the possibility).

Figure 1: Tree #20 exhibiting a large cavity on the stem.

Table 12: LIST OF TREES WITH CONDITIONS, DEFECTS, OR OTHER STRUCTURAL ISSUES.

Tag #	Common	DBH	Condition or Defect
1	Southern magnolia	42	Deadwood > 2 inches
1	Southern magnolia	42	Cavity(s) - crown
4	Southern magnolia	22	Wound(s) - stem
5	live oak	42	Wound(s) - crown
8	Southern magnolia	21	Co-dominant stems
9	live oak	38	Wound(s) - stem
15	American holly	16	Sweep
16	live oak	54	Cavity(s) - stem
19	live oak	56	Cavity(s) - stem
19	live oak	56	Cavity(s)- root flare
20	live oak	42	Cavity(s) - stem
23	live oak	52	Cavity(s) - stem
23	live oak	52	Conk/Mushroom
24	live oak	68	Cavity(s) - crown
24	live oak	68	Conk/Mushroom
25	bitternut hickory	17	Uneven crown
26	bitternut hickory	17	Uneven crown
27	live oak	34	Uneven crown
29	live oak	60	Cavity(s) - stem
33	live oak	50	Cavity(s) - stem

Tag #	Common	DBH	Condition or Defect
43	live oak	34	Wounds(s) - stem
47	water oak	13	Co-dominant stems
50	live oak	44	Cavity(s) - crown
53	live oak	58	Cavity(s) - stem
53	live oak	58	Wound(s) - stem
58	live oak	20	Uneven crown
67	loblolly pine	24	Wound(s) - stem
72	pecan	22	Conk/Mushroom
73	pecan	30	Cavity(s) - stem
82	live oak	38	Cavity(s) - stem
99	eastern redcedar	25	Wound(s) - stem
100	eastern redcedar	24	Wound(s) - stem
116	live oak	48	Wound(s) - stem
118	live oak	37	Wound(s) - stem
118	live oak	37	Wound(s) - crown
121	live oak	46	Uneven crown
121	live oak	46	Wound(s) - stem
123	Southern magnolia	22	Cavity(s) - stem

Table 13: TREES WITH GIRDLING ROOT PRESENT

During the inventory no trees were identified as having girdling roots. Ten trees were identified as being in need of root collar excavations. Root collar disorders can cause serious health and structural problems for trees and should be addressed. Please see the "soil management" section of this document for more information.

Further Evaluation & Removal

This section begins our coverage of recommendations. As part of the inventory process, the BIS team conducts a visual inspection of each tree from the ground. In this type of examination, the inspector can determine whether some aspect of tree structure or health indicates that a more comprehensive tree structure evaluation is needed to more thoroughly evaluate tree condition and risk of failure. Figure 2 provides an example of a tree defect that merits further evaluation. The presence of large, open wounds to the stem indicates that there may be a risk of failure.

Figure 2: Stem wound on Tree #284 necessitates further evaluation to more thoroughly assess the risk of failure.

In such cases, we may recommend climbing inspections, examination of the root system using a compressed-air tool (that avoids damage to roots and underground utilities), and one or more of the following: resistance drilling; the IML Resistograph, a precision drilling instrument that provides graphical output (preferred drilling method); or sound-wave examinations that produce estimates of decay percentages in targeted areas. The goal is to use the appropriate method to evaluate impact of wood decay in stems and buttress roots that show potential for failure and to determine presence and condition of the root system.

Once we complete such evaluations, we can then recommend appropriate measures, such as remediation, maintenance, or removal. (A technical report on tree structure evaluation appears in the Appendix.)

The trees listed in Table 14 below met the conditions for further evaluation.

Table 14: TREES RECOMMENDED FOR FURTHER EVALUATION

Tag #	Common	Diameter	Evaluation Type
10	Southern magnolia	38	Drill Stem
82	live oak	38	Drill Stem

Map 5: TREES RECOMMENDED FOR FURTHER EVALUATION

In some cases, our visual inspection was adequate to determine need for removal. The trees listed in Table 15 are recommended for removal.

Table 15: TREES RECOMMENDED FOR REMOVAL

Tag #	Common	DBH	GTW Priority	Total Risk Rating
123	Southern magnolia	22	1 Priority	10

Live Oaks (*Quercus virginiana*)

Live oaks are one of the most recognizable and beautiful trees in the south. Their majestic form and strong wood has made them a desirable and useful tree since the first European settlers arrived in the area four centuries ago. Live oaks are extremely resilient trees, being able to tolerate hurricane force winds and heavy rains which strike throughout their native range. As a result, defects that might be cause for serious concern or even removal in other species are not as significant for these trees. There is a strong desire to preserve the large live oaks on the site because of their historical significance. This desire must be weighed against the need to provide a safe environment for visitors to enjoy the site. Each one of the live oaks identified as having large cavities or wounds on the trunk (see table 12) should be inspected annually by a qualified arborist to evaluate any change in the tree's structural integrity. Should a tree be deemed hazardous or need to be removed in the future, leaving a 'spar' or portion of the trunk in place to provide a habitat for wildlife and preserve the original layout of the property is an acceptiable option.

Figure 3: Two dead live oak tree 'spars' left in place for wildlife habitat, aesthetic appeal, and historic significance

Map 6: TREES RECOMMENDED FOR REMOVAL

Pruning & Structural Support Systems

A commonly offered service among tree companies, pruning trees is one of the most poorly executed practices by tree workers who lack training in the basics of tree biology. "Lion's tailing," topping, and flush cuts are a few examples, and these can lead to hazardous conditions over time.

Because this practice is so misunderstood, and because specific standards exist to perform pruning correctly, the BIS team decided to include some explanation in the main body of this management plan.

Tree owners and tree-care practitioners should always keep in mind that *any pruning cut is a wound*. Informed tree-care professionals have learned to manage that wounding to preserve the health, safety, and integrity of the tree.

Improper Pruning Practices

A few of the most common pruning abuses are

- Lion's Tailing – pruning that removes interior branches along the stem and scaffold branches. This encourages poor branch taper, poor wind load distribution, and risk of branch failure. It also deprives the tree of foliage it needs to produce **photosynthates**. See Figure 4.
- Topping – pruning cuts that reduce a tree's size by using heading cuts that shorten branches to a predetermined size. This also deprives the tree of adequate foliage. See Figure 5.
- Flush Cuts – pruning cut through the **branch collar**, flush against the trunk or parent stem, causing unnecessary injury. See Figure 6.
- Using Climbing Spikes Inappropriately – Using climbing spikes on a healthy tree, for example, wounds healthy stem tissues and can lead to infection by fungal pathogens.

Figure 5: Examples of topping

Figure 4: Black oval indicates general area of excessive foliage removal

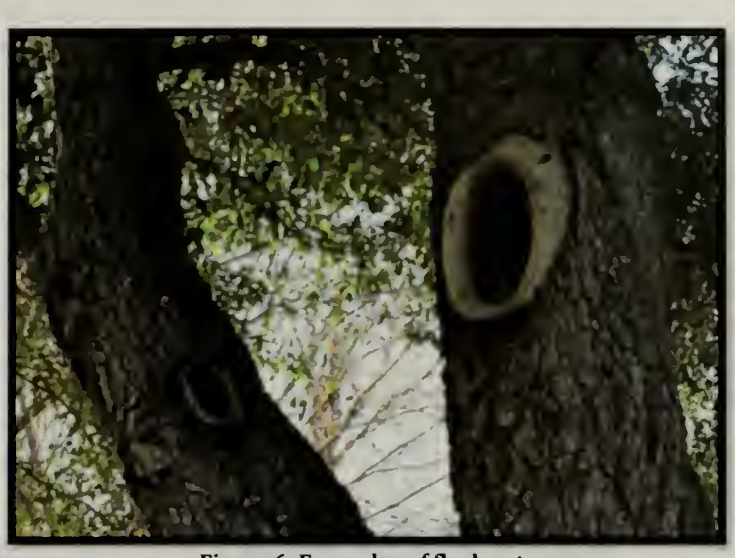


Figure 6: Examples of flush cuts

Correct Pruning Practices

For specific standards on pruning practices, readers will find ANSI Standards on this topic in the Appendix. We have, however, included below some key pruning categories and diagrams to illuminate the goal of each.

Cleaning

Selective pruning to remove one or more of the following parts: dead, diseased, and/or broken branches.

Figure 7: Illustration of crown cleaning

Raising

Selectively pruning to provide vertical clearance.

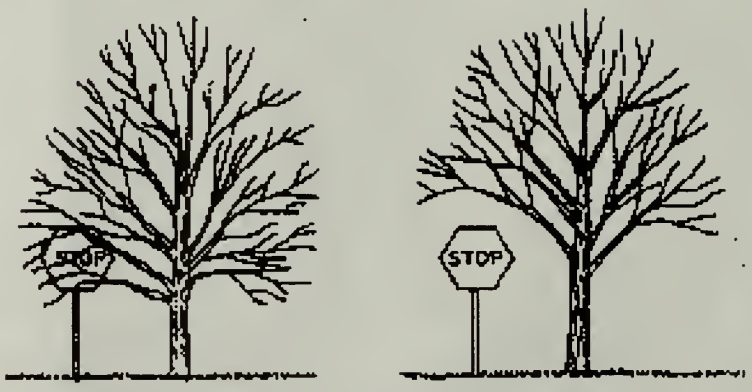


Figure 8: Illustration of crown rasing

Thinning

Selective pruning to reduce density of live branches.

Figure 9: Illustration of thinning

Reducing (Reduction Pruning)

Selective pruning to reduce height or spread.

Figure 10: Illustration of reduction purning

Structural

Selective pruning of live branches and stems to influence orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems.

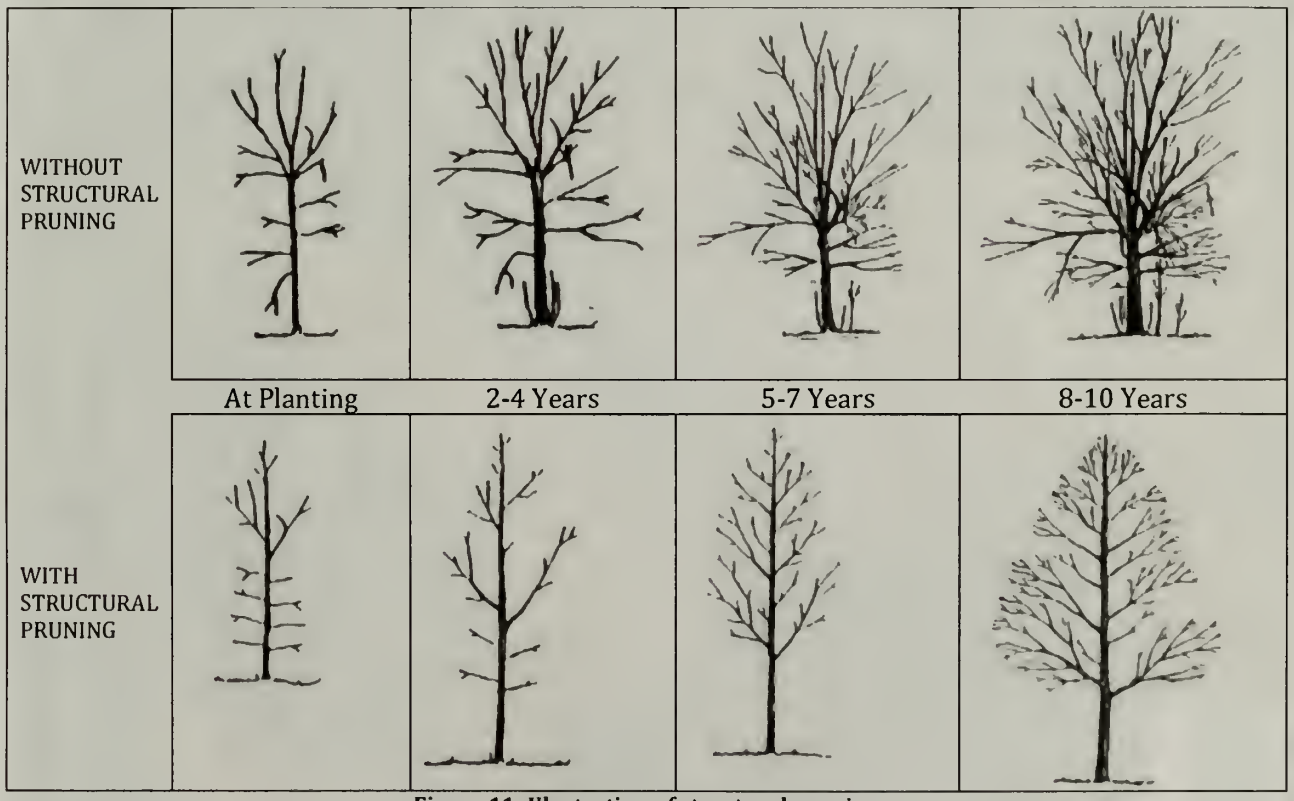


Figure 11: Illustration of structural pruning

We recommended pruning on the following trees:

Table 16: TREES RECOMMENDED FOR PRUNING

Tag #	Common	Diameter	GTW Priority	Pruning Type	Total Risk Rating
3	Southern magnolia	21	1 Priority	CLEAN	10
1	Southern magnolia	42	1 Priority	CLEAN	
42	live oak	44	1 Priority	CLEAN	
47	water oak	13	1 Priority	RAISE	
47	water oak	13	1 Priority	STRUCTURE	
55	live oak	5	1 Priority	STRUCTURE	
38	loblolly pine	18	2 Priority	CLEAN	
39	loblolly pine	18	2 Priority	CLEAN	
43	live oak	34	2 Priority	RAISE	
45	live oak	38	2 Priority	RAISE	
48	live oak	13	3 Priority	RAISE	
60	live oak	10	3 Priority	STRUCTURE	
62	live oak	8	3 Priority	STRUCTURE	
63	live oak	8	3 Priority	STRUCTURE	
64	live oak	8	3 Priority	STRUCTURE	
93	live oak	10	3 Priority	STRUCTURE	
113	live oak	8	3 Priority	STRUCTURE	
114	live oak	6	3 Priority	STRUCTURE	

Map 7: TREES BY WORK PRIORITY

Structural Support Systems

Cabling and bracing are structural support systems that can reduce risk of failure by limiting movement of stems or branches in certain situations. Examples include co-dominant stems or overextended branches with heavy foliage loads. Often cabling and bracing are combined with pruning to lighten the load on these branches or stems.

We recommend that the following tree have the existing cable systems inspected:

Table 17: TREES RECOMMENDED FOR STRUCTURAL SUPPORT SYSTEMS

Tag #	Common	DBH	GTW Priority	GTW Type
115	eastern redcedar	40	1 Priority	CABLE - INSPECT

Figure 12: Tree number 115 shown with existing cable system

Soil Management

Urban soils (as opposed to forest soils) are often mixed with the byproducts of construction activities that build our foundations, driveways, streets, parking lots, and other structures and grayscapes. This material compromises the physical, chemical, and biological properties that create healthy soils. Bartlett Tree Experts recommends several procedures and treatments that address soil quality. We address some of these below.

Soil Testing

Collecting soil samples and having them tested helps determine nutrients that may be lacking, unfavorable soil pH values, and adequacy of soil organic matter. Following laboratory test results, we can implement a prescription fertilization program to balance soil chemistry and optimize conditions for plant growth.

Mulch Application

Proper mulching provides many benefits to trees and shrubs. It moderates soil temperatures, reduces soil moisture loss, reduces soil compaction, provides nutrients, and improves soil structure. This practice results in more root growth and healthier plants. Mulch is frequently applied incorrectly, so we recommend that readers inspect the technical report on mulch application guidelines that appears in the Appendix. Figure 13 illustrates root growth density under grass versus mulch.

Figure 13: Example of root density under grass versus mulch

Bulk Density

Compacted soils are regrettably common in the urban setting. A bulk density test, which requires an undisturbed core sample, measures the level of soil compaction. Arborists can use the results to diagnose problems or to determine what size holes to dig for planting. If soil density exceeds a measured threshold for a given soil type and tree species, we recommend Bartlett's Root Invigoration program.

Root Invigoration

The aim of Bartlett's patented Root Invigoration Program is to improve soil conditions by addressing soil compaction and promoting efficient root growth, especially for high-value trees in disturbed areas. The process includes taking soil samples to determine what nutrients are deficient, performing a root collar excavation, "air-tilling" a portion of the root zone to find fine roots, incorporating organic matter, fertilizing (based on soil sample), and applying mulch. The area of the root system treated can vary by tree. For the Root Invigoration Program to be successful, proper watering techniques must be employed after the process is complete.

Root Collar Excavation

Excavating the root collar is necessary for trees whose buttress roots are covered by excess soil or mulch. Buried root collars can contribute to tree health problems, including girdling roots (See, again, Table 13), basal cankers, and masking root and lower stem decay. We have supplied a technical report on root collar disorders in the Appendix.

Figures 14, 15, and 16 provide examples of some of the above issues.

Figure 15: No root flare is visible at the tree's base. The root collar is buried.

Figure 14: Example of exposed root collar

Figure 16: Example of improper mulch application, know as "volcano mulch"

The following trees are recommended for root collar excavations:

Table 18: TREES RECOMMENDED FOR ROOT COLLAR EXCAVATIONS

Tag #	Common	DBH
37	Southern magnolia	27
39	loblolly pine	18
40	live oak	31
47	water oak	13
54	live oak	16
55	live oak	5
108	live oak	16
109	live oak	18
114	live oak	6
119	live oak	8

Map 8: TREES RECOMMENDED FOR ROOT COLLAR EXCAVATION

Pest Management

No pests or diseases were identified during the inventory. However, the BIS team still recommends an Integrated Pest Management (IPM) Program for trees in the formal landscape. An IPM program monitors for potentially damaging insects, diseases and cultural problems that are often seasonal and were not evident during our inventory visits. These pests include, but are not limited to, the following:

- Aphids – on a variety of species
- Boring Insects – on a variety of tree species
- Caterpillar Defoliators – on a variety of tree species, especially oak
- Oak Wilt – on oak
- Suspected Phytophthora Root Rot and Canker – on a variety of tree species
- Scale Insects – on a variety of tree species, especially oak
- Spider Mites – on a variety of tree species

Table 19: TREES RECOMMENDED FOR IPM PROGRAM

No pest or diseases were identified during the inventory.

Historic Live Oaks

During the inventory a line of live oaks planted during the 19th century to create an entryway from Long Point Road to the property was identified by staff at the site. The map below shows this line of trees.

Map 9: HISTORIC LIVE OAKS IDENTIFIED BY CPNHS STAFF

Entire Inventory Follows

ENTIRE INVENTORY

Table 20: ENTIRE INVENTORY

Tag #	Genus	Species	Common	DBH	Age Class	Height	Canopy Radius	Condition	GTW Priority	Estimated Value
1	Magnolia	grandiflora	Southern magnolia	42	Mature	Large (>35')	20	Fair	1 Priority	$29,122
2	Quercus	virginiana	live oak	38	Semi-mature	Large (>35')	20	Good		$37,100
3	Magnolia	grandiflora	Southern magnolia	21	Semi-mature	Large (>35')	20	Good	1 Priority	$11,450
4	Magnolia	grandiflora	Southern magnolia	22	Semi-mature	Large (>35')	20	Good		$12,567
5	Quercus	virginiana	live oak	42	Mature	Large (>35')	30	Fair		$30,739
6	Quercus	virginiana	live oak	57	Mature	Large (>35')	30	Good		$61,959
7	Quercus	virginiana	live oak	14	Semi-mature	Medium (16 to 35')	20	Good		$5,372
8	Magnolia	grandiflora	Southern magnolia	21	Semi-mature	Large (>35')	20	Good		$11,450
9	Quercus	virginiana	live oak	38	Mature	Large (>35')	30	Fair		$26,500
10	Magnolia	grandiflora	Southern magnolia	38	Mature	Large (>35')	25	Good		$35,147
11	Quercus	virginiana	live oak	38	Mature	Medium (16 to 35')	30	Good		$37,100
12	Quercus	virginiana	live oak	48	Mature	Large (>35')	35	Good		$51,236
13	Magnolia	grandiflora	Southern magnolia	26	Mature	Large (>35')	25	Good		$17,552
14	Magnolia	grandiflora	Southern magnolia	36	Mature	Large (>35')	25	Good		$32,203
15	Ilex	opaca	American holly	16	Mature	Medium (16 to 35')	20	Good		$6,647
16	Quercus	virginiana	live oak	54	Mature	Large (>35')	35	Fair		$41,854
17	Quercus	virginiana	live oak	44	Over-mature	Small (<15')	10	Dead		$0
18	Quercus	virginiana	live oak	48	Over-mature	Small (<15')	15	Dead		$0
19	Quercus	virginiana	live oak	56	Mature	Large (>35')	35	Good		$60,861
20	Quercus	virginiana	live oak	42	Mature	Large (>35')	30	Fair		$30,739
21	Magnolia	grandiflora	Southern magnolia	19	Semi-mature	Large (>35')	20	Good		$9,373
22	Magnolia	grandiflora	Southern magnolia	20	Semi-mature	Large (>35')	20	Good		$10,386
23	Quercus	virginiana	live oak	52	Mature	Large (>35')	35	Fair		$40,168
24	Quercus	virginiana	live oak	68	Mature	Large (>35')	35	Fair		$51,779
25	Carya	cordiformis	bitternut hickory	17	Semi-mature	Medium (16 to 35')	20	Good		$6,253
26	Carya	cordiformis	bitternut hickory	17	Semi-mature	Medium (16 to 35')	20	Good		$6,253
27	Quercus	virginiana	live oak	34	Mature	Medium (16 to 35')	30	Fair		$21,993

Tag #	Genus	Species	Common	DBH	Age Class	Height	Canopy Radius	Condition	GTW Priority	Estimated Value
28	Carya	cordiformis	bitternut hickory	22	Semi-mature	Large (>35')	20	Fair		$7,480
29	Quercus	virginiana	live oak	60	Mature	Large (>35')	35	Fair		$46,508
30	Quercus	virginiana	live oak	50	Mature	Large (>35')	30	Good		$53,783
31	Quercus	virginiana	live oak	44	Mature	Large (>35')	30	Good		$45,862
32	Quercus	virginiana	live oak	44	Mature	Large (>35')	30	Good		$45,862
33	Quercus	virginiana	live oak	50	Mature	Large (>35')	30	Good		$53,783
34	Quercus	virginiana	live oak	30	Mature	Large (>35')	25	Good		$24,666
35	Quercus	virginiana	live oak	64	Mature	Large (>35')	30	Good		$68,988
36	Magnolia	grandiflora	Southern magnolia	34	Mature	Large (>35')	20	Good		$29,170
37	Magnolia	grandiflora	Southern magnolia	27	Semi-mature	Large (>35')	20	Good		$18,928
38	Pinus	taeda	loblolly pine	18	Semi-mature	Large (>35')	15	Fair	2 Priority	$5,341
39	Pinus	taeda	loblolly pine	18	Semi-mature	Large (>35')	15	Fair	2 Priority	$5,341
40	Quercus	virginiana	live oak	31	Mature	Large (>35')	25	Good		$25,813
41	Quercus	virginiana	live oak	31	Over-mature	Small (<15')	10	Dead		$0
42	Quercus	virginiana	live oak	44	Mature	Large (>35')	30	Good	1 Priority	$45,862
43	Quercus	virginiana	live oak	34	Mature	Large (>35')	25	Good	2 Priority	$30,791
44	Quercus	virginiana	live oak	60	Mature	Large (>35')	35	Good		$65,112
45	Quercus	virginiana	live oak	38	Mature	Large (>35')	30	Good	2 Priority	$37,100
46	Magnolia	grandiflora	Southern magnolia	22	Semi-mature	Large (>35')	20	Good		$12,567
47	Quercus	nigra	water oak	13	Semi-mature	Medium (16 to 35')	20	Good	1 Priority	$3,413
48	Quercus	virginiana	live oak	13	Semi-mature	Medium (16 to 35')	20	Good	3 Priority	$4,632
49	Quercus	virginiana	live oak	46	Mature	Large (>35')	30	Good	3 Priority	$48,596
50	Quercus	virginiana	live oak	44	Mature	Large (>35')	35	Good		$45,862
51	Quercus	virginiana	live oak	48	Over-mature	Small (<15')	10	Dead		$0
52	Quercus	virginiana	live oak	37	Mature	Large (>35')	25	Fair		$25,398
53	Quercus	virginiana	live oak	58	Mature	Large (>35')	30	Fair		$45,024
54	Quercus	virginiana	live oak	16	Semi-mature	Medium (16 to 35')	15	Good		$7,016
55	Quercus	virginiana	live oak	5	Young	Small (<15')	10	Good	1 Priority	$685
56	Castanea	mollissima	Chinese Chestnut	14	Mature	Small (<15')	15	Good		$2,544
57	Quercus	pagoda	cherrybark oak	24	Semi-mature	Large (>35')	20	Fair		$8,308

Tag #	Genus	Species	Common	DBH	Age Class	Height	Canopy Radius	Condition	GTW Priority	Estimated Value
58	Quercus	virginiana	live oak	20	Semi-mature	Medium (16 to 35')	20	Good		$10,963
59	Quercus	nigra	water oak	20	Semi-mature	Large (>35')	20	Good		$8,078
60	Quercus	virginiana	live oak	10	Semi-mature	Small (<15')	15	Good	3 Priority	$2,741
61	Platanus	occidentalis	American sycamore	12	Semi-mature	Medium (16 to 35')	15	Good		$2,493
62	Quercus	virginiana	live oak	8	Semi-mature	Medium (16 to 35')	15	Good	3 Priority	$1,754
63	Quercus	virginiana	live oak	8	Semi-mature	Medium (16 to 35')	15	Good	3 Priority	$1,754
64	Quercus	virginiana	live oak	8	Semi-mature	Medium (16 to 35')	15	Good	3 Priority	$1,754
65	Quercus	virginiana	live oak	36	Mature	Large (>35')	25	Good		$33,992
66	Carya	illinonensis	pecan	24	Mature	Large (>35')	20	Fair		$9,495
67	Pinus	taeda	loblolly pine	24	Mature	Large (>35')	20	Good		$13,294
68	Magnolia	grandiflora	Southern magnolia	34	Mature	Large (>35')	20	Good		$29,170
69	Quercus	virginiana	live oak	44	Mature	Large (>35')	35	Good		$45,862
70	Quercus	virginiana	live oak	32	Mature	Large (>35')	30	Good		$27,496
71	Quercus	virginiana	live oak	30	Mature	Large (>35')	30	Good		$24,666
72	Carya	illinonensis	pecan	22	Mature	Medium (16 to 35')	20	Fair		$7,979
73	Carya	illinonensis	pecan	30	Mature	Large (>35')	20	Fair		$14,837
74	Carya	illinonensis	pecan	32	Mature	Large (>35')	20	Fair		$16,539
75	Carya	illinonensis	pecan	18	Semi-mature	Large (>35')	20	Fair		$5,341
76	Carya	illinonensis	pecan	32	Mature	Large (>35')	20	Fair		$16,539
77	Carya	illinonensis	pecan	24	Mature	Large (>35')	20	Fair		$9,495
78	Carya	illinonensis	pecan	22	Mature	Large (>35')	20	Fair		$7,979
79	Juniperus	virginiana	eastern redcedar	17	Semi-mature	Medium (16 to 35')	20	Good		$5,836
80	Quercus	nigra	water oak	14	Semi-mature	Medium (16 to 35')	20	Good		$3,958
81	Magnolia	grandiflora	Southern magnolia	24	Mature	Large (>35')	20	Good		$14,955
82	Quercus	virginiana	live oak	38	Mature	Large (>35')	30	Fair		$26,500
83	Diospyros	virginiana	persimmon	10	Semi-mature	Medium (16 to 35')	15	Fair		$1,236
84	Prunus	communis	common pear	5	Semi-mature	Small (<15')	10	Poor		$201
85	Carya	illinonensis	pecan	18	Semi-mature	Large (>35')	20	Fair		$5,341
86	Quercus	virginiana	live oak	33	Mature	Medium (16 to 35')	30	Good		$29,155

Tag #	Genus	Species	Common	DBH	Age Class	Height	Canopy Radius	Condition	GTW Priority	Estimated Value
87	Carya	illinonensis	pecan	18	Semi-mature	Large (>35')	15	Fair		$5,341
88	Prunus	communis	common pear	10	Mature	Small (<15')	10	Poor		$804
89	Prunus	communis	common pear	10	Mature	Small (<15')	10	Poor		$804
90	Carya	illinonensis	pecan	24	Mature	Large (>35')	20	Fair		$9,495
91	Carya	illinonensis	pecan	25	Mature	Large (>35')	20	Fair		$10,303
92	Carya	illinonensis	pecan	24	Mature	Large (>35')	20	Fair		$9,495
93	Quercus	virginiana	live oak	10	Semi-mature	Small (<15')	15	Good	3 Priority	$2,741
94	Juniperus	virginiana	eastern redcedar	26	Mature	Medium (16 to 35')	20	Good		$13,651
95	Juniperus	virginiana	eastern redcedar	25	Mature	Medium (16 to 35')	20	Good		$12,621
96	Juniperus	virginiana	eastern redcedar	30	Mature	Medium (16 to 35')	20	Good		$18,175
97	Juniperus	virginiana	eastern redcedar	32	Mature	Medium (16 to 35')	20	Good		$20,260
98	Juniperus	virginiana	eastern redcedar	26	Mature	Medium (16 to 35')	20	Good		$13,651
99	Juniperus	virginiana	eastern redcedar	25	Mature	Medium (16 to 35')	20	Fair		$9,015
100	Juniperus	virginiana	eastern redcedar	24	Mature	Medium (16 to 35')	20	Good		$11,632
101	Juniperus	virginiana	eastern redcedar	26	Mature	Medium (16 to 35')	20	Good		$13,651
102	Juniperus	virginiana	eastern redcedar	24	Mature	Medium (16 to 35')	20	Good		$11,632
103	Juniperus	virginiana	eastern redcedar	28	Mature	Medium (16 to 35')	20	Good		$15,832
104	Magnolia	grandiflora	Southern magnolia	28	Mature	Medium (16 to 35')	25	Good		$20,356
105	Carya	illinonensis	pecan	30	Mature	Large (>35')	20	Fair		$14,837
106	Quercus	virginiana	live oak	16	Semi-mature	Medium (16 to 35')	15	Good		$7,016
107	Quercus	virginiana	live oak	15	Semi-mature	Medium (16 to 35')	15	Good		$6,166
108	Quercus	virginiana	live oak	16	Semi-mature	Medium (16 to 35')	15	Good		$7,016
109	Quercus	virginiana	live oak	18	Semi-mature	Medium (16 to 35')	15	Good		$8,880
110	Quercus	virginiana	live oak	16	Semi-mature	Medium (16 to 35')	15	Good		$7,016
111	Quercus	virginiana	live oak	16	Semi-mature	Medium (16 to 35')	15	Good		$7,016
112	Quercus	virginiana	live oak	13	Semi-mature	Medium (16 to 35')	15	Good		$4,632
113	Quercus	virginiana	live oak	8	Semi-mature	Medium (16 to 35')	15	Good	3 Priority	$1,754
114	Quercus	virginiana	live oak	6	Semi-mature	Small (<15')	10	Good	3 Priority	$987
115	Juniperus	virginiana	eastern redcedar	40	Mature	Medium (16 to 35')	25	Good	1 Priority	$29,558
116	Quercus	virginiana	live oak	48	Mature	Large (>35')	35	Fair		$36,597

Tag #	Genus	Species	Common	DBH	Age Class	Height	Canopy Radius	Condition	GTW Priority	Estimated Value
117	Quercus	virginiana	live oak	50	Mature	Large (>35')	35	Good		$53,783
118	Quercus	virginiana	live oak	37	Mature	Large (>35')	25	Good		$35,558
119	Quercus	virginiana	live oak	8	Semi-mature	Medium (16 to 35')	15	Good		$1,754
120	Betula	nigra	river birch	12	Semi-mature	Medium (16 to 35')	15	Good		$3,323
121	Quercus	virginiana	live oak	46	Mature	Large (>35')	35	Fair		$34,712
122	Quercus	virginiana	live oak	44	Mature	Large (>35')	30	Fair		$32,759
123	Magnolia	grandiflora	Southern magnolia	22	Mature	Large (>35')	20	Fair	1 Priority	$8,976
124	Quercus	virginiana	live oak	36	Mature	Large (>35')	25	Fair		$24,280
125	Quercus	virginiana	live oak	28	Mature	Large (>35')	25	Good		$21,487
126	Quercus	virginiana	live oak	36	Mature	Large (>35')	25	Good		$33,992
127	Quercus	virginiana	live oak	34	Mature	Large (>35')	30	Good		$30,791
128	Quercus	virginiana	live oak	34	Mature	Large (>35')	35	Good		$30,791
129	Quercus	virginiana	live oak	40	Mature	Large (>35')	35	Good		$40,114
130	Quercus	virginiana	live oak	44	Mature	Large (>35')	35	Good		$45,862
131	Pinus	taeda	loblolly pine	30	Mature	Large (>35')	20	Good		$20,771
132	Quercus	virginiana	live oak	44	Mature	Large (>35')	30	Good		$45,862
133	Quercus	virginiana	live oak	44	Mature	Large (>35')	30	Good		$45,862

List of Appended Items Follows

LIST OF APPENDED ITEMS

Technical Reports

- ANSI A300 (Part 1) – *2008* Pruning
- Maintenance Pruning Program
- Monitor IPM Program
- Mulch Application Guidelines
- Root Collar Disorders
- Tree Structure Evaluation

Glossary